DOCUMENT RESUME

ED 184 995 SP 015 496

AUTHOR Keene, J. S.: And Others
TITLE Football Injuries Occurring on Natural Grass and Tartan Turf. A Comparison Study Covering 17 Years at the University of Wisconsin.
PUB DATE 77
NOTE 10p.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Athletes: *Athletic Fields: Athletics; *Football; *Injuries: Physical Education Facilities: *Turf Management
IDENTIFIERS *Shoe Turf Interface

ABSTRACT

A longitudinal study of university football players who played on Tartan Turf and/or natural grass was conducted to determine the types and severity of injuries occuring on the different field surfaces. Overall injury rates on Tartan Turf were found to be significantly lower than those sustained on natural grass. (JD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED184995

FOOTBALL INJURIES OCCURRING ON NATURAL GRASS AND TARTAN TURF[R]

A comparison Study Covering 17 Years at the University of Wisconsin

J.S. Keene, M.D., R.G. Narechania, M.S., K.M. Sachtjen, M.D.

and W.G. Clancy, M.D.

Division of Orthopedic Surgery

Section of Sports Medicine

University of Wisconsin Center for Health Sciences

Madison, Wisconsin

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

James S. Keene

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Address correspondence to:

J.S. Keene, M.D.
University of Wisconsin Hospitals
Section of Sports Medicine
1300 University Avenue
Madison, Wisconsin 53706

SP015496

INTRODUCTION

Over the past 10 years as the number of synthetic turf-fields increased, a controversy grew as to which playing surface is safer - natural grass or synthetic turf. Several epidemiological investigations have been undertaken to answer this question (1,3,4). The conclusions reached in these studies have varied from "many more (injuries) on synthetic turf" (4) to injury rates higher on grass as compared to certain synthetic turfs (1). Although some manufacturers have discontinued production of synthetic turf, the controversy continues.

Unlike prior investigations, this study was designed to evaluate synthetic-surface-safety for Tartan Turf^{R} alone. The University of Wisconsin-Madison has had Tartan (synthetic) Turf^{R} since 1967. We have retrospectively compared numbers and types of injuries for seven years on our natural grass surface with seven years on our Tartan Turf surface. In addition, we have prospectively recorded all injuries that occurred on our synthetic field and other grass fields for the past three years.

We do not feel as suggested by others (1,3) that an investigation involving one team for a period of years is unsuitable for examining a single variable such as field surface <u>if</u> the injuries reported have a normal distribution for those years.

METHOD

We obtained our retrospective injury data by questionnaire (Fig. 1). Questionnaires were sent to 450 University of Wisconsin varsity football players who competed on the University's grass and/or Tartan Turf^{R} field during one or more of the years from (1960-1973). The survey thus included: 1) Players who competed on grass only (1960-1967), 2) Players

who practiced on our grass surface but competed on our Tartan Turf (1967-1968), and 3) Players who competed on Tartan Turf only (1969-1973). Our questionnaires were similar to those used by other investigators (1), in that they included questions relating to the type and severity of injury, field type and condition, and several other variables (Fig. 1).

In the retrospective part of the study, we defined an injury as any traumatic change in the athlete's medical condition, reported by that athlete, that occurred during a practice or a game. This definition was the same for the prospective part of our study with the exception that the player not only reported his injury but was also examined by the team physician or trainer.

The severity of an injury was determined by the amount of practice and game time missed by the athlete. A major injury was defined as any injury where the player subsequently missed one game or one week of practice. A minor injury was defined as any injury reported where the player missed less that one week and did not miss any subsequent game.

Several other definitions were used to analyze the data obtained. A "sprain" was defined as first or second degree ligament injury. "Torn ligaments" were defined as third degree ligament injuries. "Disability" was defined as incomplete healing such that the athlete was still experiencing difficulty with the injured body part one or more years post injury.

The synthetic and natural grass surfaces studied were the surfaces used for games and practices at the University of Wisconsin's 77,000-seat football stadium. The grass surface was extremely well kept and covered the field throughout the season. The synthetic surface was

Tartan Turf[R] produced by the 3M Company and installed in 1967. The only alterations in the synthetic playing surface since installation have been the replacement of three strips of turf between the 40 yard-lines in 1968. This was due to a loss of black fibers that had changed in color but not the characteristics of the surface.

In general, shoes with seven "regular" cleats were worn on the natural grass and shoes with ten "short" cleats were worn on the synthetic surface.

RESULTS

Data was analyzed: 1) From 235 questionnaires returned of the 450 sent to varsity athletes competing during the years 1960-1973 and 2) from the records of examinations done by one of the authors on all varsity football players injured during the years 1975-1976.

Seven hundred and ten injuries were reported for the fourteen years retrospectively reviewed. Three hundred forty-six injuries occurred on grass and three hundred sixty-four injuries occurred on Tartan Turf. The total number of injuries reported for each field surface was not significantly different ($p < 0.05$). Athletes in each group were equally exposed to possible injury. One hundred fifty-one athletes competed on grass for 353 playing years with an average of 2.34 playing years per athlete. One hundred nineteen athletes competed on the Tartan Turf for a total of 269 playing years with an average of 2.26 playing years per athlete.

The specific types of injuries reported for the two surfaces did show significant differences. The three types of injuries in which there were significant differences were scrapes, sprains, and torn

ligaments. One hundred forty-two scrapes were reported on the Tartan Turf compared with fifty on the grass surface. The difference was significant at the $p < 0.01$ level. Fifty-six sprains were reported on the Tartan Turf compared with eighty-six on the grass surface. This difference was also significant at the $p < 0.01$ level. Seventeen torn ligaments were reported on the Tartan Turf as compared to 30 on the grass surface. This difference was significant at the $p < 0.05$ level.

When we further analyzed the severity of the ligament injuries that occurred, we found that 29 sprains on synthetic turf and 57 sprains on grass fit our definition of major injuries. We also found that 15 torn ligaments on synthetic turf and 24 torn ligaments on grass fit our definition of major injuries. These differences between the number of major injuries on the two surfaces were also statistically significant at the previously stated levels. Thus, analysis of the data suggests that a significantly greater number of major ligament injuries occurred on our natural grass surface as compared to our Tartan Turf. All other variables tested (see Fig. 2) demonstrated no statistical differences in the number or severity of injuries between the two playing surfaces. Specifically, we found that: 1) persistent disability as previously defined was reported by 54 athletes on natural grass and 45 athletes on synthetic turf, 2) player weight did not affect the type or severity of injuries on the two surfaces, and 3) an insignificant number of injuries occurred when either surface was wet.

Two hundred sixty-four injuries occurred during the prospective years of the study (1975-1976). Although these injuries are part of an on going study, at this time the number and severity of major ligamentous

injuries have a significantly different incidence for grass and Tartan Turf similar to that found for the retrospective years.

During both phases of the study, the majority of the athletes questioned preferred to play on synthetic turf.

DISCUSSION

It is difficult to evaluate the causative role of the turf-surface in injuries of the athlete because of the influence of the many other concommitently acting variables.

Other investigators have stated that surveillance of a single football team from year to year is unsuitable for examining a single variable such as field surface (1,3).

We feel that: 1) if one is able to obtain the report of a significant number of injuries on different playing surfaces and 2) if the injuries reported for those years studied fit a normal distribution, then statistically significant differences between data from the two playing surfaces are valid.

We realize that the athlete had to decide what type of injury he had sustained on his own during the retrospective years of our study. The fact that during the prospective years, the incidence and severity of ligamentous injuries were similar when a physician made the diagnosis suggests that the reports completed by the athletes themselves are representative.

By longitudinally evaluating varsity football players at the University of Wisconsin who played on Tartan Turf and/or natural grass, we did find that major ligament injuries occurred with a significantly higher incidence on the natural grass surface. We also found that scrapes, not unexpectedly,

occurred in significantly greater numbers on the Tartan Turf^{R}. Although some investigators have found decreasing impact absorption as synthetic turf aged, we found no significant difference in the number or types of injury as our turf "aged" (2). There were no other significant differences found between the surfaces when other variables were compared (Fig. 2).

Our results are similar to those of Adkison, et al. who found overall injury rates on Tartan Turf^{R} to be significantly lower than those seen on grass (1). Our results differ with the NFL injury study 1969-1972 which found "many more (injuries) on turf" (4). This may be explained by the fact that the pro study did not compare individual brands of synthetic turf with grass. That this might be the case is suggested by Adkison, et al. who found that the injury rate for a specific brand of synthetic turf (Astro Turf) was significantly higher than that of grass or Tartan Turf (1). Also supporting our conclusions is the work of Stanitski et al. who found that the coefficient of friction between shoe and turf for the majority of footwear tested was similar for Tartan Turf and grass, but significantly greater for Poly Turf and Astro Turf (5).

In conclusion, our study suggests that there have been a significantly lower number of major ligamentous injuries on Tartan Turf^{R} than on natural grass at the University of Wisconsin. To the detriment of the athlete, we may be prematurely returning to natural grass surfaces and unfortunately ending production of one synthetic playing surface, preferred by the athlete, that significantly reduces major ligament injuries.

BIBLIOGRAPHY

1. Adkison, J.W., Requa, R.K., and Garrik, J.G.: Injury rates in High School football. Clinical Ortho. Related Res., 99:131-136, 1974.

2. Bowers, K.D., and Martin R.B.: Impact absorption, new and old astro turf at West Virginia University. Med. Sci. in Sports, 6:217-221, 1974.

3. Bramwell, S.T., Requa, R.K., and Garrik, J.G.: High school football injuries: A pilot comparison of playing surfaces. Med. Sci in Sports, 4:166-169, 1972.

4. Grippo, NFL Injury Study 1969-1972, Final Project Report (SRI-MSD 1961) Stanford Research Institute, Menlo Park, California, 1973.

5. Stanitski, C.L., McMaster, J.H. and Ferguson, R.J.: Synthetic turf and grass: A comparative study. J. Sports Med., 2:22-26, 1974.

FIGURE 2

Variable Surface	Grass	Tartan Turf	Probability Lecel P*
Scrape	50	142	-p < 0.001
Sprain	86	56	-p < 0.01
Cut	22	19	p = 0.05
Torn Liga	30	17	-p < 0.05
Swo Joint	38	36	p = 0.05
Bro Bone	25	18	p = 0.05
Bro Tooth	13	6	-p < 0.05
Muscle Pull	38	36	p = 0.05
Conclusion	12	8	p = 0.05
Shaken Up	27	20	p = 0.05
Misc.	4	6	p = 0.05

*neg sign shows statistical difference; others show no statistically significant difference at p = 0.05